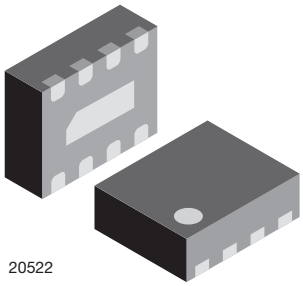
4-Channel EMI-Filter with ESD-Protection



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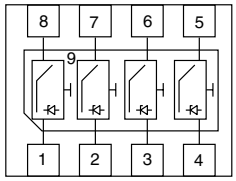

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FEATURES

- Ultra compact LLP1713-9L package
- Low package profile of 0.6 mm
- 4-channel EMI-filter
- Low leakage current
- Line inductance L_S = 10 nH
- Low line resistance R_S = 12 Ω
- Typical cut off frequency f_{3dB} = 150 MHz
- ESD-protection acc. IEC 61000-4-2
  ± 25 kV contact discharge
  ± 25 kV air discharge
- e4 - precious metal (e.g. Ag, Au, NiPd, NiPdAu) (no Sn)
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e4

RoHS COMPLIANT

GREEN (5-2008)**

MARKING (example only)

20719

Dot = pin 1 marking
Y = type code (see table below)
XX = date code

ORDERING INFORMATION			
DEVICE NAME	**ORDERING CODE**	**TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)**	**MINIMUM ORDER QUANTITY**
VEMI45LA-HNH	VEMI45LA-HNH-GS08	3000	15 000

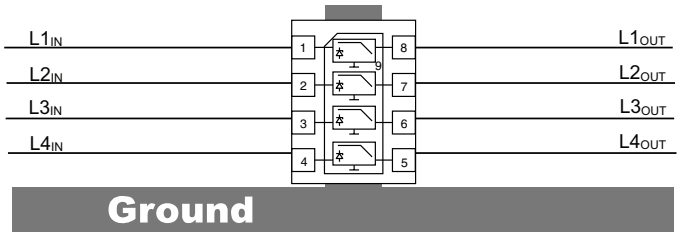
PACKAGE DATA						
DEVICE NAME	**PACKAGE NAME**	**TYPE CODE**	**WEIGHT**	**MOLDING COMPOUND FLAMMABILITY RATING**	**MOISTURE SENSITIVITY LEVEL**	**SOLDERING CONDITIONS**
VEMI45LA-HNH	LLP1713-9L	H	3.7 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals

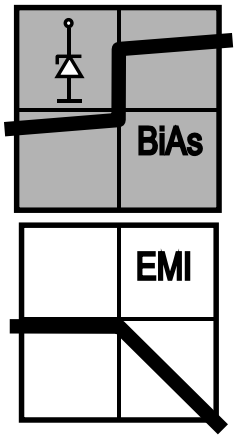
ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	All I/O pin to pin 9; acc. IEC 61000-4-5; t_p = 8/20 µs; single shot	I_{PPM}	4	A
ESD immunity	Contact discharge acc. IEC61000-4-2; 10 pulses	V_{ESD}	± 25	kV
	Air discharge acc. IEC61000-4-2; 10 pulses		± 25	
Operating temperature	Junction temperature	T_J	- 40 to + 125	°C
Storage temperature		T_{STG}	- 55 to + 150	°C

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

APPLICATION NOTE

With the VEMI45LA-HNH 4 different signal or data lines can be filtered and clamped to ground. Due to the different clamping levels in forward and reverse direction the clamping behaviour is Bidirectional and Asymmetric (BiAs).





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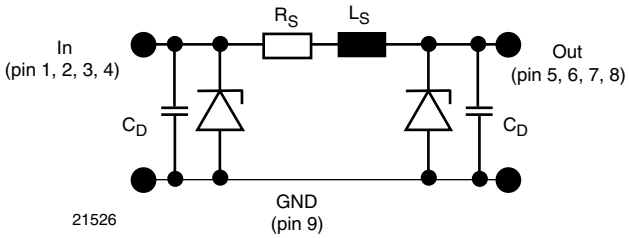
The 4 independent EMI-filter are placed between

pin 1 and pin 8,
pin 2 and pin 7,
pin 3 and pin 6 and
pin 4 and pin 5.

They all are connected to a common ground pin 9 on the backside of the package.

The circuit diagram of one EMI-filter-channel shows two identical Z-diodes at the input to ground and the output to ground. These Z-diodes are characterized by the breakthrough voltage level (V_{BR}) and the diode capacitance (C_D). Below the breakthrough voltage level the Z-diodes can be considered as capacitors. Together with these capacitors and the line resistance R_S between input and output the device works as a low pass filter. Low frequency signals ($f < f_{3dB}$) pass the filter while high frequency signals ($f > f_{3dB}$) will be shorted to ground through the diode capacitances C_D.



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Each filter is symmetrical so that both ports can be used as input or output.

ELECTRICAL CHARACTERISTICS VEMI45LA-HNH						
PARAMETER	**TEST CONDITIONS/REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of channels which can be protected	$N_{channel}$	-	-	4	channel
Reverse stand off voltage	at I_R = 1 µA	V_{RWM}	5	-	-	V
Reverse current	at $V_R = V_{RWM}$	I_R	-	-	1	µA
Reverse break down voltage	at I_R = 1 mA	V_{BR}	6	-	-	V
Pos. clamping voltage	at I_{PP} = 1 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	-	7.7	8.5	V
	at $I_{PP} = I_{PPM}$ = 4 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	-	8.3	9.5	V
Neg. clamping voltage	at I_{PP} = - 1 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	- 1	-	-	V
	at $I_{PP} = I_{PPM}$ = - 4 A applied at the input, measured at the output; acc. IEC 61000-4-5	$V_{C\text{-}out}$	- 1.2	-	-	V
Input capacitance	at V_R = 0 V; f = 1 MHz	C_{IN}	-	47	53	pF
	at V_R = 2.5 V; f = 1 MHz	C_{IN}	-	28	31	pF
Line inductance	Measured between input and output	L_S	-	10	-	V
Line resistance	Measured between input and output; I_S = 10 mA	R_S	-	12	-	Ω
Cut-off frequency	V_{IN} = 0 V; measured in a 50 Ω system	f_{3dB}	-	150	-	MHz

Note

- Ratings at 25 °C, ambient temperature unless otherwise specified. All inputs (pin 1, 2, 3 and 4) to ground (pin 9)

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

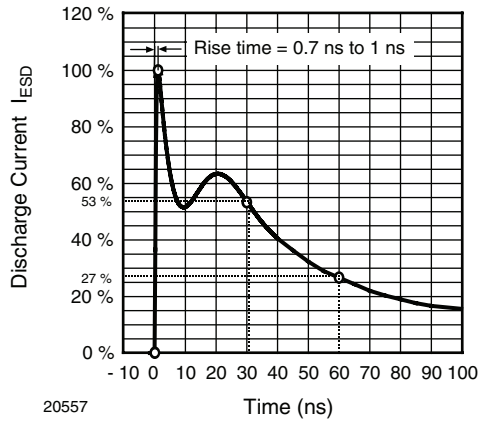


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω/150 pF)

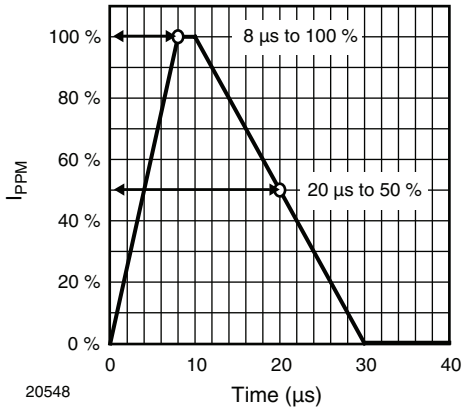


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form acc. IEC 61000-4-5

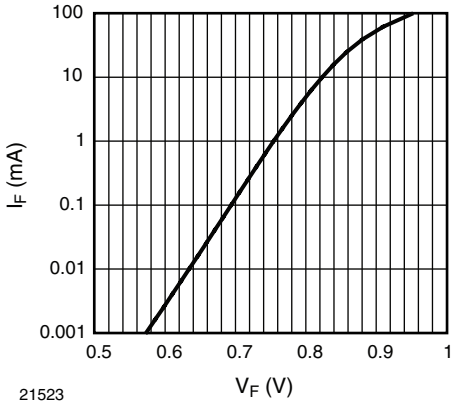


Fig. 3 - Typical Forward Current I_F vs. Forward Voltage V_F

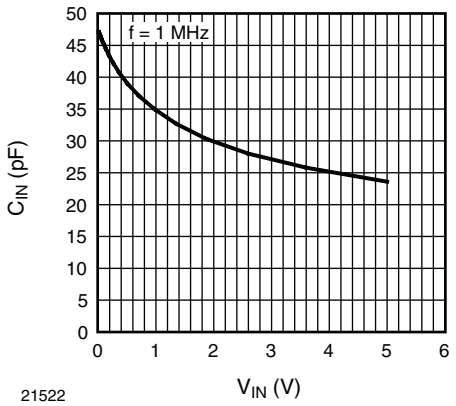


Fig. 6 - Typical Input Capacitance C_{IN} vs. Input Voltage V_{IN}

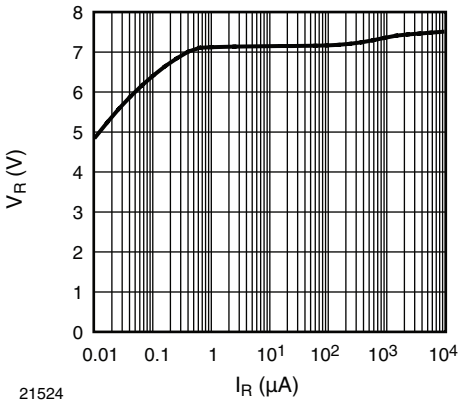


Fig. 4 - Typical Reverse Voltage V_R vs. Reverse Current I_R

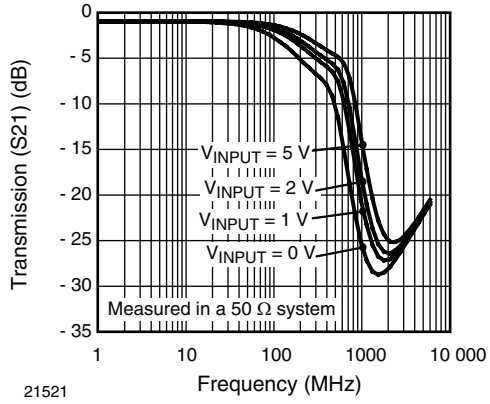


Fig. 7 - Typical Small Signal Transmission (S21) at Z_O = 50 Ω

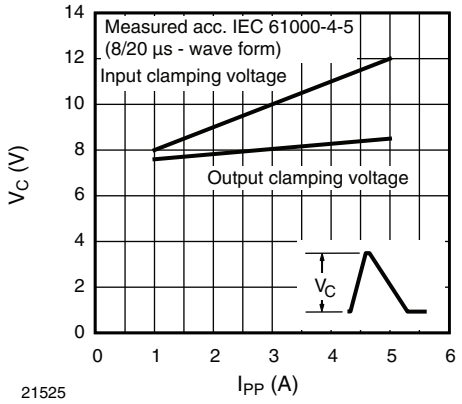
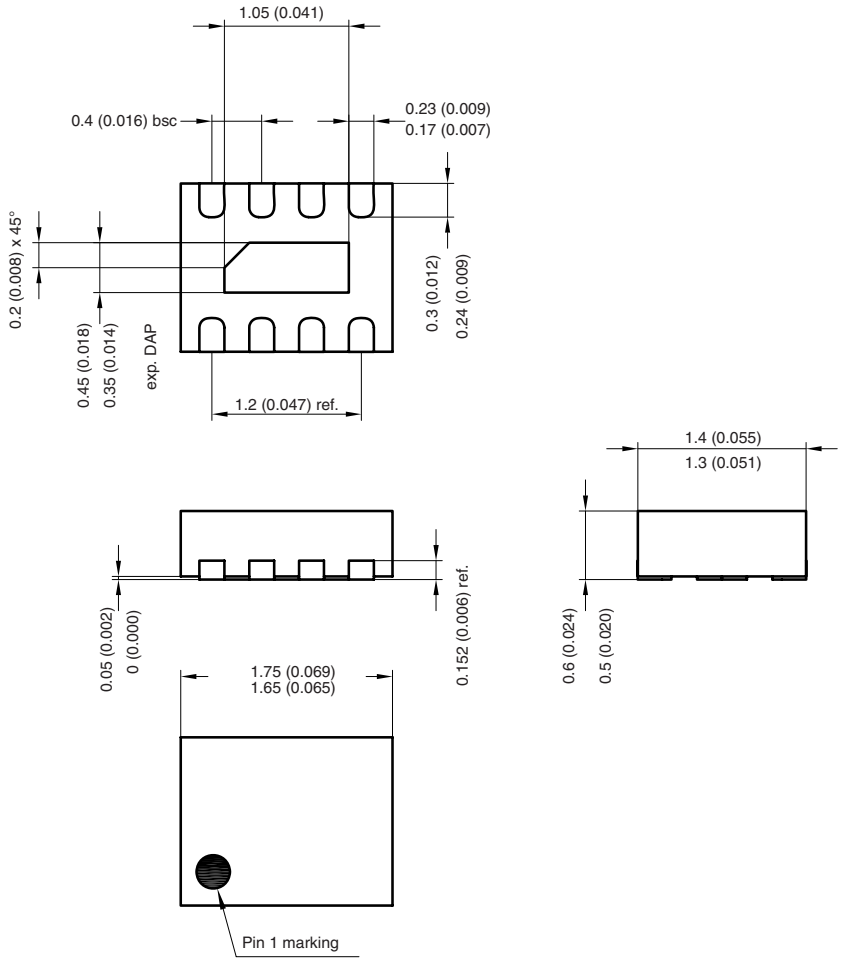
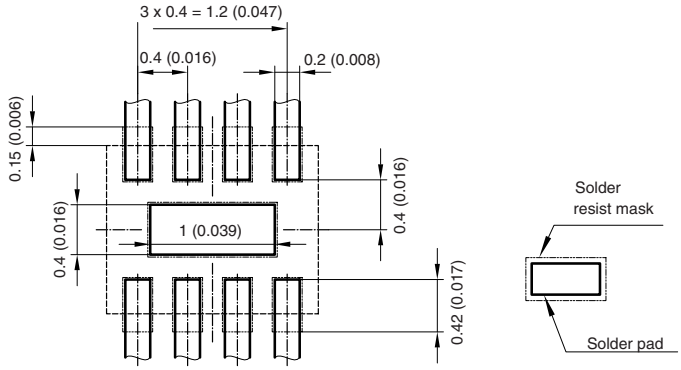


Fig. 5 - Typical Peak Clamping Voltage V_C vs. Peak Pulse Current I_{PP}

PACKAGE DIMENSIONS in millimeters (inches): **LLP1713-9L**



Foot print recommendation:



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